

**REMARKS**

Claims 1, 3, 4, 6-9, 12 and 13 are all the claims pending in the application. Support for new claim 13 may be found in the specification as originally filed, for example, at page 6, lines 5-8. Support for the amendment to claim 1, last line, may be found in the specification as originally filed, for example, at page 5, lines 5-20 and page 17, lines 1-2. The transparent synthetic resin layers are adhered to the photochromic layer formed by curing a mixture of polyurethane prepolymer, the curing agent and a photochromic organic compound. Support for new claim 13 may be found in the specification as originally filed, for example, at page 6, lines 5-8.

**I. Formal Matter - The Information Disclosure Statement**

After the mailing of the Office Action dated January 3, 2003, Applicants filed an Information Disclosure Statement (IDS). The Examiner is requested to acknowledge receipt of the Information Disclosure Statement filed April 4, 2003 and to initial and return a copy of the Form PTO/SB/08.

Additionally, filed concurrently herewith is an additional IDS.

**II. The Rejection Under 35 U.S.C. §112**

Claim 12 is rejected under 35 U.S.C. §112, second paragraph, as allegedly being indefinite.

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The Examiner states that there is insufficient antecedent basis for "said synthetic resin sheet" (claim 12, line 11) "because there are two synthetic resin sheets."

Claim 12 has been amended to clarify the language and to more particularly point out and distinctly claim Applicants' invention. In particular, claim 12 recites a first transparent synthetic resin sheet and a second transparent synthetic resin sheet.

For the above reasons, it is respectfully submitted that Applicants' claims are clear and definite and it is requested that the rejection under 35 U.S.C. §112 be reconsidered and withdrawn.

**III. The Objection to the Specification**

The Examiner states that the amendment filed November 18, 2002 does not overcome the Examiner's objection to the specification.

The Examiner alleges that the specification is still replete with typographical and grammatical errors to the point where it impedes a reader from gaining a full, clear, concise, and exact understanding of the applicant's invention.

The Examiner also states that claim 6 is dependent on a cancelled claim.

First of all, claim 6 is amended to depend from independent claim 1. As to Applicants' specification, Applicants have amended the specification for clarity purposes. Applicants respectfully submit that the present specification is clear and

definite as written and it is requested that the objection to the specification be reconsidered and withdrawn.

**IV. The Rejection Based on Ormsby et al**

Claims 1, 9 and 11-12 are rejected under 35 U.S.C. §102(b) as allegedly being anticipated by Ormsby et al as evidenced by Bright.

Applicants respectfully submit that the present invention is not anticipated by or obvious over the disclosures of Ormsby et al and request that the Examiner reconsider and withdraw this rejection in view of the following remarks.

As noted by the Examiner, Ormsby et al discloses a multilayer laminate structure that includes two clear substrates with a polyurethane (PU) layer between them and the PU layer contains the photochromic dye. The PU composition in Ormsby et al includes diisocyanate, diol and triol (tri-methylol propane). In Ormsby et al, tri-methylol propane functions as the curing agent.

In contrast, in the present invention, a curing agent consisting of a compound with a hydroxyl group on at least both ends obtained from diisocyanate and polyol is used.

Submitted herewith is a Declaration Under 37 C.F.R. §1.132 by Mr. Kenji Kouno, one of the inventors of the instant application. The Declaration contains comparative experiment using tri-methylol propane as disclosed in Example 1 of

Ormsby et al, instead of the curing agent as used in Example 2 of the present invention (an inventive sample representative of the present invention).

As demonstrated in the Declaration, in the transparent synthetic resin laminate using tri-methylol propane of Ormsby et al, both the color development and the color disappearance speed were lower than those of Example 1. That is, the color development and the color disappearance speed of inventive Example 1 were unexpectedly improved over the comparative example. Furthermore a portion of the photochromic layer peeled off from the polycarbonate film of outer layers during curing and then all the photochromic layer soon peeled off.

The Examiner asserts that "regarding the properties that the applicant claims the current invention to have that the reference does not, the examiner notes that such properties are not within the claims" (page 9). The meaning of the word "photochromism" set forth in Applicants' claims is known in the art and defines the phenomena that a substance species changes its color in a state of solid or solution by irradiation of light, including ultraviolet ray or visible ray of short wave length, and then reverts into its original color when in a dark place. Generally, the speed of reverting into the original color is low.

In the present invention, the photochromism property on claims was evaluated by both the color development speed and the color disappearance speed. In the transparent synthetic resin of the present invention, the photochromic layer

is adhered to each two transparent synthetic resin sheet as outer layers. Applicants have clarified this in claim 1.

In the comparative experiment using the tri-methylol propane of Ormsby et al as the curing agent, a portion of the photochromic layer peeled off from the polycarbonate film of outer layers during curing and then all the photochromic layer soon peeled off. This means that the transparent synthetic resin laminate used tri-methylol propane as the curing agent does not function as the transparent synthetic resin laminate of the present invention. That is, when the photochromic layer is peeled off from the polycarbonate film of outer layers, it becomes very difficult to apply such transparent synthetic resin laminate to an optical lens because it is very difficult to bend such transparent synthetic resin laminate in the production of the optical lens.

Further, the Examiner asserts that "the triols function as the curing agents the applicant claims and the resulting crosslinked polymer will have the same structure as the polymer formed using the method the applicant claims" (pages 3 to 4).

Applicants' respectfully submit that the examiner's assertion is not correct. The curing agent to be used to cure a PU composition is a reactant which reacts with a polyurethane prepolymer. It is not a catalyst. That is, the curing agent is part of the resulting crosslinked polymer and forms bridges in the crosslinked

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polymer. Therefore, the photochromic layer of the present invention has a different chemical structure from that using tri-methylol propane of Ormsby et al.

The Examiner asserts that in Ormsby et al the PU is deposited between two CR39 plates and the Examiner asserts that CR39 is polycarbonate, noting Bright (Office Action, page 4).

Submitted herewith in the IDS are four literature references concerning CR39 including "Chemical Survey" No. 39, 1998, p174-175 (English translation), USP Nos. 2,370,565, 2,542,386 and 2,379,218.

As described in the above literature references, CR-39 (trade article name) is a monomer of allyldiglycol carbonate, produced by PPG in the USA, and polyallyldiglycol carbonate is produced by curing allyldiglycol carbonate monomer in a catalyst. Bright also describes curing of allyldiglycol carbonate (Bright, col. 2, lines 24 to 33, and col. 3, lines 23 to 39).

That is, polyallyldiglycol carbonate is a thermosetting resin. On the other hand, polycarbonate, which is generally derived from bisphenol A, is a thermoplastic resin.

As described on Table 1 of "Chemical Survey" No. 39, 1998, P175 and Bright (USP No. 5,319,007, col. 2, lines 19 to 22) polycarbonate is clearly distinguished from polyallyl diglycol.

Trade name "IUPILON" used in Examples 1 to 12 of the specification is polycarbonate derived from bisphenol A. In the IDS, Applicants submit a catalogue that describes IUPILON.

For the above reasons, it is respectfully submitted that the subject matter of claims 1, 9 and 11-12 is neither taught by nor made obvious from the disclosures of Ormsby et al and it is requested that the rejection under 35 U.S.C. §102 be reconsidered and withdrawn.

**V. The Rejection Based on Okoroafor et al in view of Ormsby et al**

Claims 1, 3-4, 9 and 11-12 are rejected under 35 U.S.C. §103(a) as allegedly being unpatentable over Okoroafor et al in view of Ormsby et al as evidenced by Bright.

Applicants respectfully submit that the present invention is not anticipated by or obvious over the disclosures of Okoroafor et al in view of Ormsby et al and request that the Examiner reconsider and withdraw this rejection in view of the following remarks.

Okoroafor et al (USP 5,942, 158) discloses a polymerizable organic composition comprising;

- (a) at least one capped polyisocyanate having at least two capped isocyanate groups, the capping groups being non fugitive,
- (b) at least one polythiol having at least two thiol groups, and

- (c) optionally, a reactive hydrogen compound having at least two reactive hydrogen groups.

(Okoroafor et al, col. 2, lines 33 to 35, col. 12, claim 1 and Abstract).

Further, Okoroafor et al, col. 10, line 9 to col. 12, line 3, discloses that photochromic substances are used in the composition.

The polymerizable organic composition of Okoroafor et al contains polythiol having at least two thiol groups as an indispensable component. The examples of polythiol are described in Okoroafor et al, col. 6, lines 13 to col. 7, lines 62. Therefore, it is clear that when the polymerizable organic composition is subjected to polymerization treatment after decapping, the polythiol reacts polyisocyanate to form polythiourethane.

In contrast, the photochromic layer of the present invention is a cured polyurethane mixture, but not a cured polythiourethane mixture, because no polythiol is used in the photochromic layer of the present invention.

Thus, the photochromic layer of the present invention is different from that Okoroafor et al.

In the polymerizable organic composition of Okoroafor et al, capped polyisocyanate is used. The capping groups are nonfugitive and examples thereof include 1H-azoles such as 1H-imidazole and 1H-pyrazol.



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It is described in Okoroafor et al, col. 3, lines 6 to 9, that the term "non-fugitive capping group" is a capping group which, upon decapping or deblocking from the isocyanate, remains substantially within the forming polymerizate.

The Examiner asserts in the Office Action, page 9, item 16, lines 3 to 6, that "the end-capped groups either are degassed from the composition or they form products which are not detrimental to the final product" (emphasis added).

However, Okoroafor et al describes at col. 3, lines 9 to 13, that the nonfugitive capping group further preferably does not interfere appreciably with the reaction between the resulting free isocyanate group and either of the polythiol (b) or reactive hydrogen compound (c). Okoroafor et al also describes on col. 3, lines 13 to 21 that the nonfugitive capping groups remain in the polymerizate and react with other nonfugitive capping groups to form oligomeric species with the polymerizate and react with decapped isocyanate or reactive hydrogen groups to form polymeric species.

On the other hand, Okoroafor et al teaches at col. 11, lines 54 to 63, that when a photochromic substance(s) is (are) added to the polymerizable organic composition of Okoroafor et al prior to polymerizing, the photochromic substance(s) sometimes come(s) to be deactivated due to adverse interactions with the non-fugitive capping groups, the thiol, etc.

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Therefore, there is neither description, nor teaching that the remained nonfugitive capping group, such oligomeric species and polymeric species thus formed are not detrimental to the properties of the final product, particularly to photochromism propertied of the final product added photochromic substance(s).

The photochromic layer of the present invention does not contain such remained nonfugitive capping group, such oligomeric species and polymeric species and the thiol.

Thus, even if Okoroafor et al is combined with Ormsby et al, it would not obvious to obtain the present invention as specified in claims 1, 3-4, 6-9 and 11-12, for at least the reason that the polymerizable organic composition containing photochromic substance(s) of Okoroafor et al is essentially different from that in the cured polyurethane mixture as the photochromic layer of the present invention.

For the above reasons, it is respectfully submitted that the subject matter of claims 1, 3-4, 6-9 and 11-12 is neither taught by nor made obvious from the disclosures of Okoroafor et al is combined with Ormsby et al and it is requested that the rejection under 35 U.S.C. §103(a) be reconsidered and withdrawn.

**VI. The Rejection Based on Okoroafor et al in view of Ormsby et al further in view of Perrott et al**

Claims 7 and 8 are rejected under 35 U.S.C. §103(a) as allegedly being unpatentable over Okoroafor et al. in view of Ormsby et al. as evidenced by Bright as applied to claim 1 above, and further in view of Perrott et al.

The Examiner's basic position is that it would have been obvious to a person of ordinary skill in the art to use "HALS" and an antioxidant in the composition taught by Okoroafor et al.

Applicants respectfully submit that the present invention is not anticipated by or obvious over the disclosures of Okoroafor et al, Ormsby et al and Perrott et al and request that the Examiner reconsider and withdraw this rejection in view of the following remarks.

First of all, Perrott et al does not overcome the deficiencies in Ormsby et al and Okoroafor et al as set forth above.

Additionally, as the Examiner pointed out, hindered amine light stabilizers (HALS) are well known in the art as light stabilizers for polymer composition. Further, it is also well known in the art to use hindered phenols that have three or more hindered phenol groups as antioxidant. Perrot et al discloses both of these practices.

In the present invention, even when such known hindered amine light stabilizers (HALS) and such known antioxidant containing three or above of

hindered phenol are used in the cured polyurethane mixture as the photochromic layer, the transparent synthetic resin laminate of the present invention exhibits excellent photochromism properties.

For the above reasons, it is respectfully submitted that the subject matter of claims 8 and 9 is neither taught by nor made obvious from the disclosures of Okoroafor et al, Ormsby et al and Perrott et al and it is requested that the rejection under 35 U.S.C. §103(a) be reconsidered and withdrawn.

**VII. The Rejection Based on Okoroafor et al in view of Ormsby et al further in view of Toba et al**

Claim 6 is rejected under 35 U.S.C. §103(a) as allegedly being unpatentable over Okoroafor et al. in view of Ormsby et al. as evidenced by Bright as applied in claim 1 above, and further in view of Toba et al.

The Examiner's basic position is that it would have been obvious to a person of ordinary skill in the art to use tolylene diisocyanate (TDI) in the composition taught by Okoroafor et al.

Applicants respectfully submit that the present invention is not anticipated by or obvious over the disclosures of Okoroafor et al, Ormsby et al and Toba et al and request that the Examiner reconsider and withdraw this rejection in view of the following remarks.

First of all, Toba et al does not overcome the deficiencies in Ormsby et al and Okoroafor et al as set forth above.

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In claim 6, the curing agent is a compound with a hydroxyl group on at least both ends derived from tolylene diisocyanate and polypropylene glycol.

The Examiner asserts that Toba et al discloses a polyol made from TDI (Toba et al, col. 11, line 64) used as part of a two-component PU adhesive (Toba et al, col. 14, lines 56-63). However, Toba et al merely describes "there are cited, for example, isocyanate compounds such as tolylene diisocyanate (which may be said as "TDI")" col. 11, lines 62 to 65. There is no description in Toba et al that TDI is used as part of a curing agent.

For the above reasons, it is respectfully submitted that the subject matter of claim 6 is neither taught by nor made obvious from the disclosures of Okoroafor et al, Ormsby et al and Toba et al et al or and it is requested that the rejection under 35 U.S.C. §103(a) be reconsidered and withdrawn.

**VIII. Japanese Patent Publication No. 63-178193**

Japanese Patent Publication No. 63-178193 is cited on the enclosed IDS, together with a partial English translation.

JP63-178193 discloses a composition for formation of a urethane paint matrix and an organic compound with photochromic properties. Further, as described in Table 2 of the Examples, the use of triethanolamine and ethyl diethanolamine as a curing agent is disclosed. The attached Declaration includes a comparative

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experiment using triethanolamine and/or ethyldiethanolamine as curing agent of JP63-178193.

In the comparative experiment, a portion of the photochromic layer peeled off from the outer layers during curing and then all the photochromic layer soon peeled off.

JP63-178193 uses non-yellowing diisocyanate. Examples of the non-yellowing diisocyanate include aliphatic diisocyanates and alicyclic diisocyanates (claim 4). The curing reactivity of aliphatic diisocyanates and alicyclic diisocyanates is lower than that of aromatic diisocyanates.

When the aliphatic diisocyanates or alicyclic diisocyanates are cured with a curing agent, a curing catalyst in addition to a curing agent is necessary (Examples, Table 2) because the curing reaction is slow. In the regard, when aromatic diisocyanates are used for curing, a curing catalyst is generally not necessary.

Further, in order to promote the curing reaction in case of the aliphatic diisocyanates and alicyclic diisocyanates, a curing agent having a high curing activity is used. Triethanolamine and ethyldiethanolamine used in JP63-178193 exhibits a high curing activity. When such curing agent having a high curing activity is used in the formation of the photochromic layer on a polycarbonate film as used in Comparative Example 7 of the declaration, the curing rate becomes high because the activity of curing agent is too high. In Comparative Example 7 in the

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declaration, it appears that since the curing rate became high, the photochromic layer did not adhere to the polycarbonate film. However, in the present invention, the curing agent having a low curing rate and exhibiting excellent photochromism property was selected.

**IX. Conclusion**

In view of the above, Applicants respectfully submit that their claimed invention is allowable and ask that objection to the specification, the rejection under 35 U.S.C. §112, the rejection under 35 U.S.C. §102 and the rejections under 35 U.S.C. §103 be reconsidered and withdrawn. Applicants respectfully submit that this case is in condition for allowance and allowance is respectfully solicited.


If any points remain at issue which the Examiner feels may be best resolved through a personal or telephone interview, the Examiner is kindly requested to contact the undersigned at the local exchange number listed below.

Applicants hereby petition for any extension of time which may be required to maintain the pendency of this case.

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The USPTO is directed and authorized to charge all required fees, except for the Issue Fee and the Publication Fee, to Deposit Account No. 19-4880. Please also credit any overpayments to said Deposit Account.

Respectfully submitted,



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23373

PATENT TRADEMARK OFFICE

Date: June 3, 2003



**APPENDIX**

**VERSION WITH MARKINGS TO SHOW CHANGES MADE**

**IN THE SPECIFICATION:**

**The specification is changed as follows:**

**The first full paragraph on page 1 is amended as follows:**

The present invention relates to a transparent synthetic resin laminate with photochromism property and, specifically, to a transparent synthetic resin laminate [with photochromism property for use of an optical lens which is excellent in both control of thickness of a photochromic coated film and surface smoothness thereof and exhibits a high color development speed and a high color disappearance speed] with excellent photochromism property exhibiting both a high color development speed and a high color disappearance speed. The transparent synthetic laminate may be used as an optical lens and is excellent in both control of thickness of a photochromic coated film and surface smoothness thereof.

**The paragraph bridging pages 1 and 2 is amended as follows:**

As conventional optical lenses such as photochromic lenses, inorganic lenses have generally [spread] been used. That is, [it was usual to add an inorganic coating layer with photochromism property to a surface of a glass or a curing plastic such as CR-39] usually, an organic coating layer with photochromic property was added to a surface of a glass or a surface of plastic lenses such as CR-39. Recently, as a lens itself, the use of plastic lenses with high impact resistance have spread.

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Particularly, in United States of America, lenses made from a polycarbonate [lenses] have widely [spread] proliferated and demand for a sun glass with impact resistance has [suddenly] rapidly increased because of extensive outdoor activities.

**The paragraph bridging to pages 2 and 3 is amended as follows:**

Further, Japanese Patent Kokai (Laid-open) No.61—148048 discloses a photochromic laminate [interposed] with a photochromic layer containing a [spironaphth] spironaphtho oxazine derivative interposed between transparent material layers. Although the prior art discloses an example in which one liquid type polyurethane resin is contained in a photochromic layer, both a color development speed and a color disappearance speed are low, and thus that photochromic laminate is insufficient.

**The first full paragraph on page 3 is amended as follows:**

Moreover, also in photochromic lenses, various [process] processes such as direct kneading into a resin and coating on a resin surface [were] have been tried. However, they are not successful and are not [yet] put into practice because of [development shortage in performances] performance problems due to insufficient heat resistance of the photochromic elements during kneading and, also due to problems in surface coating, and contrast shortage from limitation of coated film thickness.

**The second full paragraph on page 3 is amended as follows:**

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Thus, in [a] the present situation, there [is obtained] exists no transparent synthetic resin laminate with photochromism property as a photochromic lens in which both a color development speed and a color disappearance speed are high and surface smoothness of a coated film and control of coated film thickness in a photochromic layer are excellent.

**The paragraph bridging pages 3 and 4 is amended as follows:**

The present invention solves the above-mentioned problems in the prior art [problems]. An object of the present invention is to provide a transparent synthetic resin laminate with photochromism property in which both a color development speed and a color disappearance speed are high and contrast in color development is maintained for a long time and the surface smoothness of a coated film and the control of thickness of a coated film in a photochromic layer are excellent.

**The first full paragraph on page 4 is amended as follows:**

[Under such situation, as] As a result of studies of the above-mentioned problems in the prior art[ problems], the inventors have [found that there is obtained] invented a transparent synthetic resin laminate in which both a color development speed and a color disappearance speed are high and contrast in color development is maintained for a long time and the surface smoothness of a coated film and the control of thickness of a coated film in a photochromic layer are excellent, by interposing a photochromic layer formed by curing a mixture of a two-

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liquid type polyurethane of a polyurethane prepolymer and a curing agent, a photochromic organic compound, a light stabilizer and an antioxidant between two transparent synthetic resin layers, [and have accomplished] to accomplish the present invention.

**IN THE CLAIMS:**

**Claim 11 is canceled.**

**The claims are amended as follows:**

1. (Twice Amended) A transparent synthetic resin laminate with photochromism property consisting essentially of two transparent synthetic resin sheet layers and a photochromic layer interposed between said two transparent synthetic sheet layers, wherein the transparent synthetic resin in said two transparent synthetic resin sheet layers, is, each the same or different, a polycarbonate resin or a polymethyl methacrylate resin and said photochromic layer is [formed by curing a] a cured polyurethane mixture of a polyurethane prepolymer with an isocyanate group on both ends obtained from diisocyanate and polyol, a curing agent [comprising] consisting of a compound with a hydroxyl group on at least both ends obtained from diisocyanate and polyol, and a photochromic organic compound, adhering to each of said two transparent synthetic resin sheet layers.

6. (Amended) The laminate according to claim [5] 1, wherein said curing agent is a compound with a hydroxyl group on at least both ends derived from tolylene diisocyanate and polypropylene glycol.

12. (Twice Amended) A process for producing a transparent synthetic resin laminate with photochromism property which comprises:

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coating a mixture of a polyurethane prepolymer with an isocyanate group on both ends obtained from diisocyanate and polyol, a curing agent [comprising] consisting of a compound with a hydroxyl group on at least both ends obtained from diisocyanate and polyol, a photochromic organic compound and a solvent on one side of a first transparent synthetic resin sheet of a polycarbonate resin or a polymethyl methacrylate resin,

then, removing the solvent from the mixture to [a state not to contain substantially the solvent] form a substantially solvent-free mixture,

then, adhering [another] a second transparent synthetic resin sheet of a polycarbonate resin or a polymethyl methacrylate resin to the coated side of said first transparent synthetic resin sheet, and then, curing the substantially solvent-free mixture, thereby, forming a photochromic layer.

**Claim 13 is added as a new claim.**



IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

#13  
06/09/03  
AS

Applicant : Chiharu NISHIZAWA, et al.

Serial No. : 09/980,010

Filed : November 30, 2001

For : TRANSPARENT SYNTHETIC RESIN LAMINATE  
WITH PHOTOCHROMISM PROPERTY

Art Unit : 1711

D E C L A R A T I O N

Honorable Commissioner of

Patent & Trademarks

Washington, D.C. 20231

I, Kenji KOUNO, Japanese citizen, residing at c/o  
Mitsubishi Gas Chemical Company Inc., Corporate Research  
Laboratory, 22 Wadai, Tsukuba-shi, Ibaraki-ken 300-4247 Japan,  
Declare:

That I am an inventor of the above application, and  
familiar with the invention and prosecution history of said  
application ;

I performed comparative experiment in order to  
demonstrate that a transmittance, a color development speed, a  
color disappearance speed and appearance of the transparent  
synthetic resin laminate with photochromism property of the

present invention and adhesion of the photochromic layer are superior to those of the transparent synthetic resin laminates used the curing agent (tri-methylol propane) disclosed in Example 1 of Ormsby et al (USP No. 4,889,413) and the curing agent (triethanolamine and/or ethyldiethanolamine disclosed in Japanese Publication No. 63-178193 instead of the curing agent to be used in the present invention.

### Experiment

#### Comparative Example 6

The same experiment as in Example 1 of the present invention was performed except that 3g of tri-methylol propane was used instead of 3g of the curing agent of Example 1.

The thickness of the photochromic layer thus obtained was measured. Further, the laminated sheet thus obtained was evaluated.

A portion of photochromic layer peeled off from the polycarbonate film during cure of the photochromic layer. The sample of the laminated sheet was taken up from the portion in which the photochromic layer did not peel off. After the completion of evaluation of the laminate sheet, all the photochromic layer soon peeled off from the polycarbonate film.

#### Comparative Example 7

The same experiment as in Example 1 of the present invention was performed except that each amount of 3g of



triethanolamine, 3g of ethyldiethanolamine, and 1.5g of triethanolamine and 1.5g of ethyldiethanolamine was used instead 3g of the curing agent of Example 1.

The thickness of each photochromic layer thus obtained was measured. Further, each laminated sheet thus obtained was evaluated.

A portion of photochromic layer peeled off from the polycarbonate film during cure of the photochromic layer. The sample of the laminated sheet was taken up from the portion in which the photochromic layer did not peel off. After the completion of evaluation of the laminated sheet, all the photochromic layer soon peeled off from the polycarbonate film. In each case of only triethanolamine, only ethyldiethanolamine and both triethanolamine and ethyldiethanolamine, the same result was obtained.

#### Experimental result

The thickness of the photochromic layers and the evaluation results of the laminated sheets were shown in Table 1.

#### Conclusion

(1) In Comparative Example 6, both the color development speed and the color disappearance speed were lower than those of Example 1. Further, a portion of the photochromic layer peeled off from the polycarbonate film during curing and then all the

photochromic layer soon peeled off.

(2) Although both the color development speed and the color disappearance speed in each case of Comparative Example 7 were about the same as those of Example 1, in each case, a portion of the photochromic layer peeled off from the polycarbonate film during curing and then all the photochromic layer soon peeled off.

Table 1

	Thickness of photochromic layer ( $\mu$ m)	Transmittance in maximum			Color development speed ta (sec)	Color disappearance speed tb (sec)	Appearance
		absorption wave length		in irradiation (%)			
		ultraviolet					
		in non-irradiation (%)					
Example 1	177	83	58	13	13	○	
Comp.Ex. 6	177	82	58	15	43	×※4	
Comp.Ex. 7※1 ※2 ※3	175	84	60	12	13	×※4	
	175	84	60	12	13	×※4	
	175	84	60	12	13	×※4	

Note ※1 The case of only triethanolamine

※2 The case of only ethyldiethanolamine

※3 The case of both triethanolamine and ethyldiethanolamine

※4 The photoromic layer peeled of from the polycarbonate film.

The undersigned declarant declares further that all statements made herein of his own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the application or any patent issuing thereon.

Signed this day of April 4, 2003

Kenji Kouno

Kenji KOUNO